ESTIMATING THE EFFECT OF RAINFALL AND INDICATOR BACTERIA IN AN EPIDEMIOLOGICAL STUDY

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Background and Aims: Climate change scenarios point to the fact that Sweden will be affected by more extreme temperatures and more extreme precipitation. This may indicate that water treatment plants will face larger risks since more pathogens are expected to enter the raw water system. Göta River, running in the south-west of Sweden, is a fresh water supply to the population of Gothenburg. Turbidity and indicator bacteria are frequently studied to decide if the water is appropriate to produce drinking water. Our first objective is to study the potential associations between rainfall, turbidity and indicator bacteria and assess if effects are delayed in time, in order to subsequently conduct time series analysis on acute gastrointestinal (AGI) illnesses in the population.
Method: We have used a distributed lags non-linear (DLNM) regression model, which describes simultaneously the relationship along the space and the lag dimension of the predictor. We have daily mean values from online turbidity measures which were accessible between 2001 and 2010. 3 various types of indicator bacteria are sampled 2-4 times a week in raw water and available data were accessed between 2004 and 2010. Data of daily precipitation were accessible 30 kilometers upstream (2001-2010).
Results: When controlling for time trends and seasonal patterns, autoregressive Gaussian models shows significant effects of rainfall on both turbidity and indicator bacteria. Turbidity is predicted to increase with factor 1.15 (1.4) at 20mm (50mm) rain and significant effects are visible at lag 1- 4 while peaks at lag 2. Coliform bacteria increase with factor 2.4 (95% CI: 2.0, 2.6) at 20 mm of rain at lag 2.
Conclusion: Results confirm that precipitation is a good predictor to both turbidity and indicator bacteria in Göta River and will be used in the next phase where AGI will be studied.